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History / Histoire

# People Behind Exclusive Eponyms of Radiologic Signs (Part I)

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## Introduction

An eponym in medicine is the name of a disease or a structure based on or derived from the name of a person. Eponyms are frequently used in the fields of both radiology and clinical disciplines. They play an important role in proper reporting and communication. Use of eponyms provides an efficient, easy, and short way of describing signs and syndromes. Eponyms also honor those who have valuably contributed to medicine. Eponyms are links to our history. Historical knowledge about eponyms opens up to us the personality of the people who developed the modern science of medicine.

Who were these people behind the radiologic eponyms? They began with the first physicians to dedicate their lives and careers to diagnostic imaging and include radiologists, surgeons, pathologists, and engineers. It is not easy to understand and define the process of the creation of eponyms. It seems that the personality of the author was not a factor. Some of these people were rewarded and famous. Some of them are virtually unknown, with just a few published works or even only one. Some of them worked in world-renowned centers and some in medium-sized hospitals or private clinics.

An enormous number of medical articles are published. What transforms the description given in an article into the eponym? What gives life to the eponym? What defines how long and how renowned this ''life'' is? Why do some eponyms become widely known and used in publications and in clinical practice and others are abandoned? Interestingly, quite frequently, just a few sentences in the original article were picked up and cited to create the eponym. The initial citation, in fact, was the birth act for the eponym. Chronologically, most eponyms used in radiology today were created in the first half of the 20th century. No eponyms seem to be originating from articles published starting from the late 1970s.

There is an interesting trend in the spelling of eponyms and noticed by F. M. Hall [1]. Traditionally, eponyms were recorded as possessives, as if the sign or disease belonged to the honored individual (eg, Rigler's). Over the past few decades, a trend, started by omitting the apostrophe (Riglers), resulted more recently in elimination of the possessive altogether (Rigler sign).

Eponyms live their own lives. They may be even ''stronger'' than we would like them to be [2]. Sometimes, the description of a radiologic sign (especially in the early 20th century) does not match the original description by the author. As a result, it is incorrectly applied and used for years in the medical literature. In other cases, the name is misspelled in the articles and even in the textbooks.

Numerous publications, including the interesting Web site www.whonamedit.com, provide information about eponyms in different fields of science. However, no exclusive list of eponyms related to radiologic signs is known to the authors. Hence, it was decided to focus on eponyms related to originally described imaging signs. Some eponyms are still in active use, others, likely mirroring the progress of imaging and diagnostic techniques, are almost forgotten. It was attempted to provide a brief insight into the life and work of the persons who gave their name to the eponyms. The authors decided to avoid the eponyms of the syndromes and symptoms that can be radiologically diagnosed but are related to people who lived years before the first x-ray image was obtained or whose description did not include imaging. In this article, the authors tried to find the original works, or at least as

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close as possible in time to the original publication, to verify the authentic description of the radiologic sign and the correct spelling of the author's name. With the current issue we begin a series of articles describing the exclusive eponyms of radiologic signs.

*Bibliography and note*

[1] Hall FM. Medical eponyms. RadioGraphics 2006;26:1134.

[2] As it proved to be in the case with Reiter's syndrome, Hans Reiter disgraced himself by participating in the health system of the Third Reich and being responsible for medical experiments in a concentration camp. However, his name is still sometimes in use, despite suggestions that the syndrome should be renamed ''reactive arthritis syndrome.''

**Albers-Schönberg's disease (osteopetrosis, marble bone disease) increased radiologic density of the bones, described by Heinrich Ernst Albers-Schönberg in 1904, less than 9 years after Roentgen's discovery of x-rays**.

Heinrich Ernst Albers-Schönberg (Figure 1) was born on January 21, 1865, in Hamburg, Germany, and died there on June 6, 1921. He studied medicine in Tübingen and Leipzig, and graduated in 1891. He started his career in 1892 as an assistant physician in the department for women and children at the newly established Allgemeines Krankenhaus Hamburg-Eppendorf. For his self-sacrificing activity during the cholera epidemic, he was granted an education journey to Berlin and Vienna. In 1895, he settled as a practitioner in Hamburg.

Albers-Schönberg immediately understood the importance of Roentgen's discovery, and, in 1897, together with Georg Deycke, he established a private institution for the application of radiographic techniques to internal medicine. He gave up his private practice and concentrated his efforts entirely on radiology and became the first specialist in this field of medicine. That year, 1897, with Georg Deycke, Albers-Schönberg founded the journal *Fortschritte auf dem Gebiete der Röntgenstrahlen*. When Deycke left for Constantinople (Istanbul of our days), Albers-Schönberg ran the institute and the journal alone. In 1903, Albers-Schönberg was appointed as a radiologist at the Hamburg Hospital and 2 years later became the head of radiology. In 1915, he moved to a similar post at Allgemeines Krankenhaus St Georg, Hamburg. He had considerable talent for organization and design of a new radiographic department.

In 1904, Albers-Schönberg received the Grand Prize of the World's Fair in St Louis, MO. His diagnostic x-ray pictures had far better clarity than any of the competitors' work. During World War I, Albers-Schönberg was awarded a Red Cross medal for his work in the army. In 1919, in recognition of his phenomenal contribution to radiology, the University of Hamburg bestowed a special honor upon Albers-Schönberg by electing him as Ordentlicher (full professor). This was the first full professorship of its kind. He held this tenure until his death.

In these early days of radiology, nobody knew to warn about the dangers of radiation. Being careless and unprotected, Albers-Schönberg developed radiation-induced neoplasia in his hands, thorax, and shoulder, and, in 1908, his right middle finger and left arm were amputated. He had great pain in the last period of his life.

In 1903, he found a damaging effect of radiation on the reproductive glands of rabbits, a discovery that induced the development of effective methods of protection and research about sterilization. Albers-Schönberg invented compression diaphragm and other technical innovations. His main book, *Die Röntgentechnik,* which described radiographic techniques, was translated into Italian and Russian, and appeared in many editions.

Albers-Schönberg was a tall elegant man, friendly, sincere, and ready to help. He was popular among students for his sense of humor and zest for life. He died at the age of 56 years from cardiac failure as a consequence of pneumonia and left directions that the results of his autopsy should be published in the interest of other sufferers.

*Bibliography*

[1] Albers-Schönberg H. Röntgenbilder einer seltenen Knochenerkrankung. Münch Med Wochenschr 1904;51:365.

[2] Albers-Schönberg H. Die Röntgentechnik; Lehrbuch für Ärzte und Studierende. Hamburg: L. Gräfe & Sillem; 1903.

**Baastrup's disease (Morbus Baastrup, diarthrosis interspinosa, osteoarthrosis interspinosa, kissing spine disease): mutual compression of the spinous processes, with formation of bridges of closely approximated adjacent lumbar vertebrae, described in 1933 by the Danish radiologist, Christian Ingerslev Baastrup, who noticed it on radiologic assessment of patients who had pain in the back when standing erect, which was relieved by bending forward.**

Christian Ingerslev Baastrup (Figure 2) was born on January 24, 1885, in Copenhagen, Denmark, and died on October 24, 1950, at Rigshospitalet, Copenhagen. He studied medicine in Copenhagen and graduated with highest distinction in 1909. In 1911, after serving as an assistant physician in the departments of otolaryngology and ophthalmology, he was requested to apply for a position as an assistant in the roentgen department at Rigshospitalet. He answered the call with a certain reluctance, because, at that time, roentgenology did not enjoy high esteem in medical circles. His first chief and teacher was the prominent roentgenologist H. J. Panner. In 1914, Baastrup was appointed assistant of the genial pioneer J. F. Fischer in the new hospital at Bispebjerg. At Fischer's early death in 1922, Baastrup succeeded him as chief of the department, the most modern in Copenhagen at that time. He was chief of the x-ray clinic from 1922 and was appointed physician-in-chief (''overlage'') in 1935.

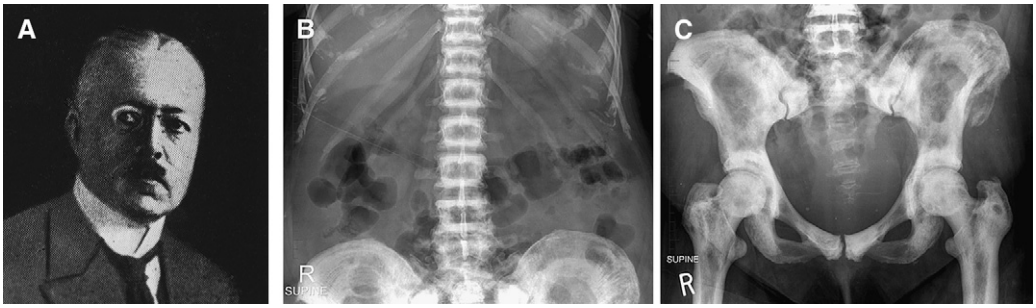


Figure 1. (A) Heinrich Ernst Albers-Schönberg (186–1921). Courtesy of the National Library of Medicine. (B) Osteopetrosis or marble bone disease. (C) Rugger jersey spine and increased density of the pelvic bones.

Baastrup collaborated on the journal *Acta Radiologica*. He initiated the establishment of the Museum of Medical History of the University of Copenhagen, for which he secured one of the world's largest and most complete collections of x-ray apparatuses. He also invented the Baastrup-Johnsen Roentgen dosimeter. He is remembered for his quiet, amicable humor and his hospitable home, in which he entertained his guests with amusing anecdotes of different countries, having been a great traveler in his younger days. He died from cancer of the larynx at the age of 65.

Interestingly, on the Web site www.whonamedit.com and some other sources, he mistakenly is mentioned as being born in 1855 and married in 1883 (2 years before his actual birth).

*Bibliography*

[1] Baastrup CI. On the spinous processes of the lumbar vertebrae and the soft tissue between them, and on pathological changes in that region. Acta Radiol 1933;14:52–4.

[2] Edling L. Christian Ingerslev Baastrup: in memoriam. Acta Radiol 1951;35:326–30.

**Carman meniscus sign: semicircular (meniscoid) configuration of gastric ulcer, seen in profile with compression, suggestive of malignancy.**

Russell Daniel Carman (Figure 3) was born in 1875 in Iroquois, Ontario, and died on June 17, 1926. He completed his medical courses at Marion Sims College of Medicine in St Louis, MO, and received the medical (MD) degree in 1901.

While practicing general medicine in St Louis, Carman acquired an x-ray machine early in his practice, and, through hard work, he became recognized in the area as an expert in x-ray diagnosis. X-ray tubes in those days contained a small amount of gas necessary for the initial bombardment of the cathode by positive ions to allow the cathode to emit electrons. The function of these tubes was highly unpredictable, and considerable expertise was required for Carman and other pioneers to create a satisfactory x-ray image.

Carman was appointed professor of roentgenology at St Louis University and Washington University Schools of Medicine. In 1913, invited by William J. Mayo, Carman founded the Department of Diagnostic Radiology at the

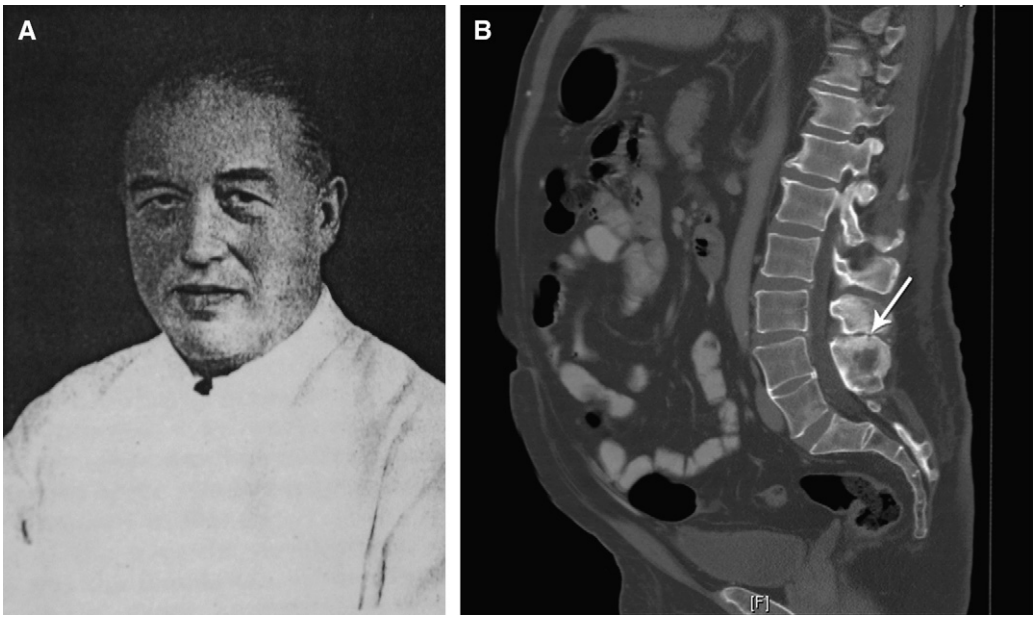


Figure 2. (A) Christian Ingerslev Baastrup (1885–1950). Published with permission from *Acta Radiologica.* (B) Baastrup disease, with close approximation and contact of adjacent spinous processes, with resultant enlargement, flattening, and reactive sclerosis of apposing interspinous surfaces (arrow).

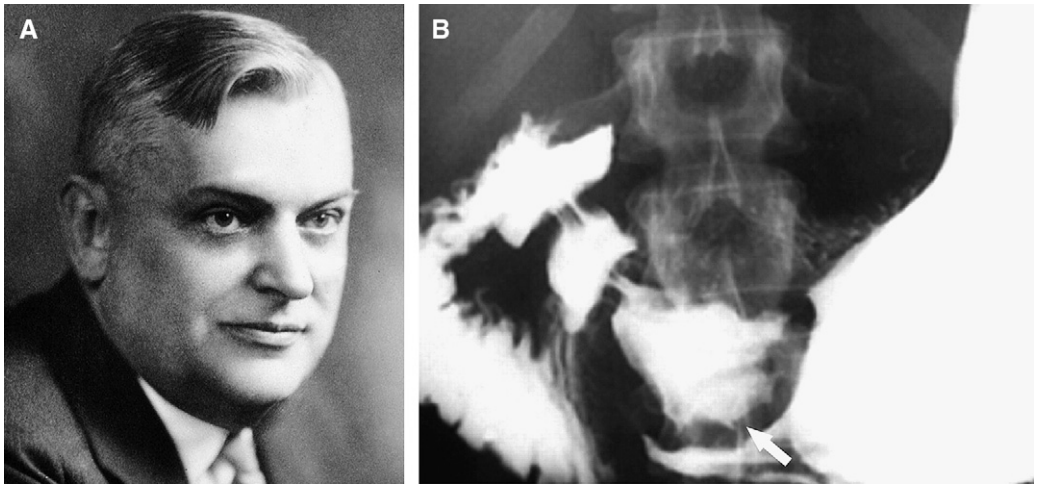


Figure 3. (A) Russell Daniel Carman (1875–1926). Courtesy of Dr J. Kanne and Radiological Society of North America (RSNA). (B) Carman meniscus sign: semicircular configuration of gastric ulcer seen in profile with compression (arrow). Courtesy of Dr J. Kanne and RSNA.

Mayo Clinic and was a head of the Mayo Section on Roentgenology. Carman held that position until his death. From 1907 to 1917, when working with gas tubes, Carman studied and gathered data on the roentgenologic aspects of gastrointestinal diseases. To confirm and correlate his results, he regularly attended operations. Carman believed that ''a few minutes of screening is equivalent to hundreds of plates'' and relied primarily on rapid, accurate fluoroscopy, with use of manual palpation. In the early years, before the perfection of reliable spot films, he also used the orthodiagraphoscope, an apparatus custom-made for him by the Keleket Corporation, which allowed the image to be traced on a fluoroscopic screen with a pen and later transferred to paper.

In collaboration with Albert Miller, a skilled medical writer, Carman published his book *The Roentgen Diagnosis of Diseases of the Alimentary Canal* in 1917. It was the first definitive text on alimentary tract roentgenology and is still an influential reference. In addition to the best-known sign of ulcerating carcinoma, which bears his name, he and Miller also described other classic findings, such as ''hourglass'' stomach, the ''niche,'' the ''filling defect,'' and the ''incisura.''

Carman was extremely friendly, charming, and intelligent. He was interested in cars and in the design of x-ray equipment, including a rocker for shaking and drying x-ray plates and a revolving radiographic table that allowed stereoscopic and Bucky diaphragm work.

In September 1925, Carman became ill and underwent fluoroscopy. Films were placed on Carman's desk without comment. He took the images and, holding them up to the window, stated ''cancer of the stomach, inoperable.'' An hour later, he presented a lecture to 2600 physicians at the Interstate Postgraduate Assembly of North America. He remained active in the field until his death of the disease for which he had become famous.

*Bibliography*

[1] Carman RD, Miller A. The Roentgen Diagnosis of Diseases of the Alimentary Canal. Philadelphia, PA: Saunders; 1917.

[2] Brown LR. A tribute to Russell Daniel Carman. Mayo Clin Proc 1995;70:1215–7.

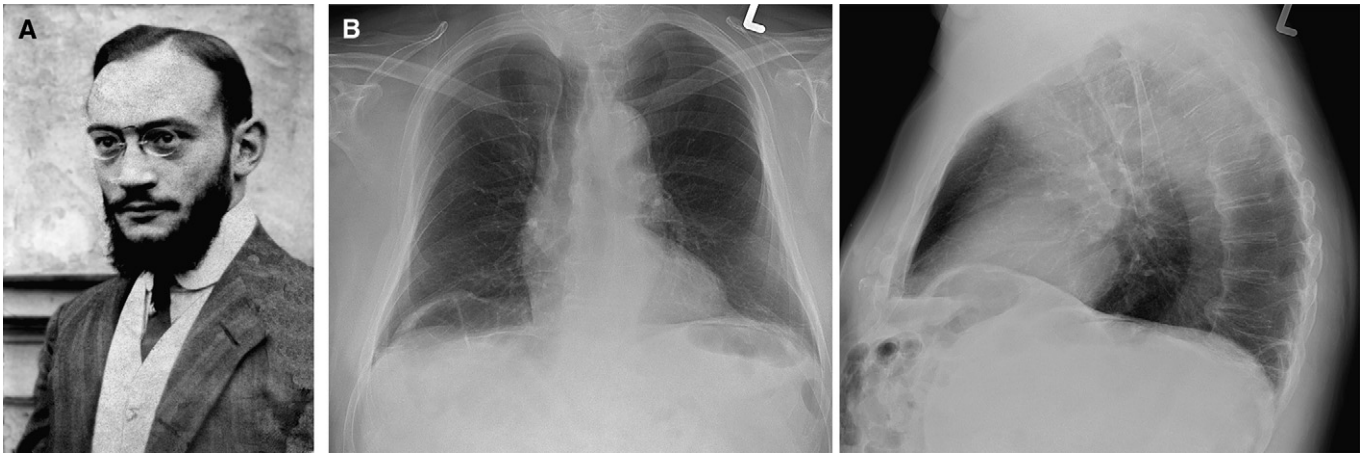


Figure 4. (A) Demetrius Chilaiditi (1883–1975). A previously unpublished photograph from the family archives. Courtesy of Gerry Livadas. (B) Chilaiditi syndrome: interposition of a bowel between the liver and the right diaphragm.

**Chilaiditi syndrome: interposition of a bowel between the liver and right diaphragm when the patient is upright; it is associated with abdominal pain, nocturnal vomiting, anorexia, and distension.**

Unfortunately, information about Demetrius Chilaiditi (Figure 4) is limited. He was born in Vienna, Austria, on April 11, 1883, and died in Istanbul on January 2, 1975. He was an Ottoman subject of Greek origin. Chilaiditi studied medicine at the University of Vienna and graduated in 1908. He gained radiologic experience while working at the III Medical University Clinic in Vienna and at the Zentral-Röntgeninstitut. One of his teachers was Professor Guido Holzknecht who had described retrocardiac space. After moving to Constantinople (Istanbul), Chilaiditi became the second radiologist with a private laboratory there and one of the first members of the Turkish Radiological Society. Chilaiditi also worked as a radiologist at the English, French, Greek, and Italian hospitals in Constantinople.

The phenomenon of interposition of the intestine between the liver and the diaphragm was first described by Cantini in 1865. In 1899, Béclère presented the necropsy and roentgenological findings in a patient thought to have a subdiaphragmatic abscess. In his work, published in 1910, Chilaiditi reported anatomoradiographic aspects of 3 asymptomatic cases of the appearance of subdiaphragmatic air on plain radiography because of temporary hepatodiaphragmatic interposition of the colon. Bowel interposition is caused by congenital anomalies of the falciform ligament of the diaphragm. Some patients complained of a feeling of pressure on the upper part of the belly, which receded when lying down. Since then, this condition has been associated with Chilaiditi's name. Chilaiditi also published other works on the radiotherapy of malignant tumours, hypertrichosis, gynaecological diseases, and duodenal stenosis.

*Bibliography and note*

[1] Chilaiditi D. Zur Frage der Hepatoptose und Ptose im allgemeinen im Anschluss an drei Fälle von temporärer, partieller Leberverlagerung. Fortschr Röntgenstr 1910;16:173–208.

[2] Walsh SD, Cruikshank JG. Chilaiditi syndrome. Age Ageing 1977;6:51–7.

[3] Beclere A. Rectification d'une erreur de diagnostic: ectopie du colon transverse prise a l'examen radioscopique, pour un abces gazeux sousphrenique. Bull Mem Soc Med Hop Paris 1899;16:506–7.

[4] Personal correspondence with Gerry Livadas.

**Codman triangle: pattern seen in rapidly growing bone processes, such as neoplasms, particularly osteosarcoma and osteomyelitis. When a process is growing too fast for the periosteum to respond with even thin shells of new bone, sometimes only the edges of the raised periosteum will ossify. A localized, triangular ridge of new bone is formed where periosteum is elevated. The sign was described by Boston surgeon E. A. Codman.**

Ernest Amory Codman (Figure 5) was born on December 30, 1869, in Boston, MA, and died on November 23, 1940, in Ponkapoag, MA. He belonged to the First Families of Boston (also called Boston Brahmins: the class of descendants from the English Protestants who founded the city and settled New England). Codman graduated from Harvard Medical School in 1895 and completed his internship at Massachusetts General Hospital. He became a member of the Harvard faculty and was a founder of the American College of Surgeons. He lost his staff privileges in 1914 when the hospital refused to institute his plan for evaluating the competence of surgeons. In 1915, Codman was ostracized and ordered, by his colleagues, to step down as chair of the local surgical society for public insult after he presented a large cartoon at a meeting of the society that portrayed greedy surgeons grasping for gold from wealthy patients (shown as an ostrich with its head buried in Boston's prosperous Beacon Hill).

Codman is famous for his lifelong systematic effort to follow up each of his patients years after treatment and to record the end results of their care. He established the first bone tumour registry in the United States in the 1920s and set the precedent for a national exchange of information on bone tumours. Codman said that most clinical research described only very good results and, therefore, were mere advertisements. He believed that real improvement would be made when clinicians wrote about their errors and how to reduce them.

On December 7, 1917, the day after the munitions ship explosion in Halifax, Nova Scotia, which killed 3,000 and injured 20,000 people, Codman closed his hospital and left to help care for victims. Codman made important contributions to surgery, including his privately printed 1934 book, *The Shoulder,* the first medical book on this topic. At the Web site www.whonamedit.com, his name is misspelled as Ernest Armory Codman.

*Bibliography*

[1] Codman EA. Bone Sarcoma, an Interpretation of the Nomenclature Used by the Committee of the Registry of Bone Sarcoma of the American College of Surgeons. New York: P. B. Hoeber; 1925.

[2] Codman EA. The Shoulder. Boston: Thomas Todd Co; 1934.

[3] Neuhauser D. Ernest Amory Codman MD. Qual Saf Health Care 2002;1:104–5.

**Doppler effect: a change in the frequency of light and sound waves is related to the velocity of the source relative to an observer.**

The Doppler effect is used in sonography to estimate blood flow. Strictly speaking, Doppler effect probably should not be included in this article, because it is not related to an imaging sign; however, this eponym became so widely used and so tightly connected to imaging that it is just impossible to avoid it here.

Christian Doppler (Figure 6) (on his baptismal certificate, Christian Andreas Doppler; on his gravesite, Christian Johann Doppler) was born on November 29, 1803, in Salzburg, Austria. He died on March 17, 1853, in Venice, Italy.

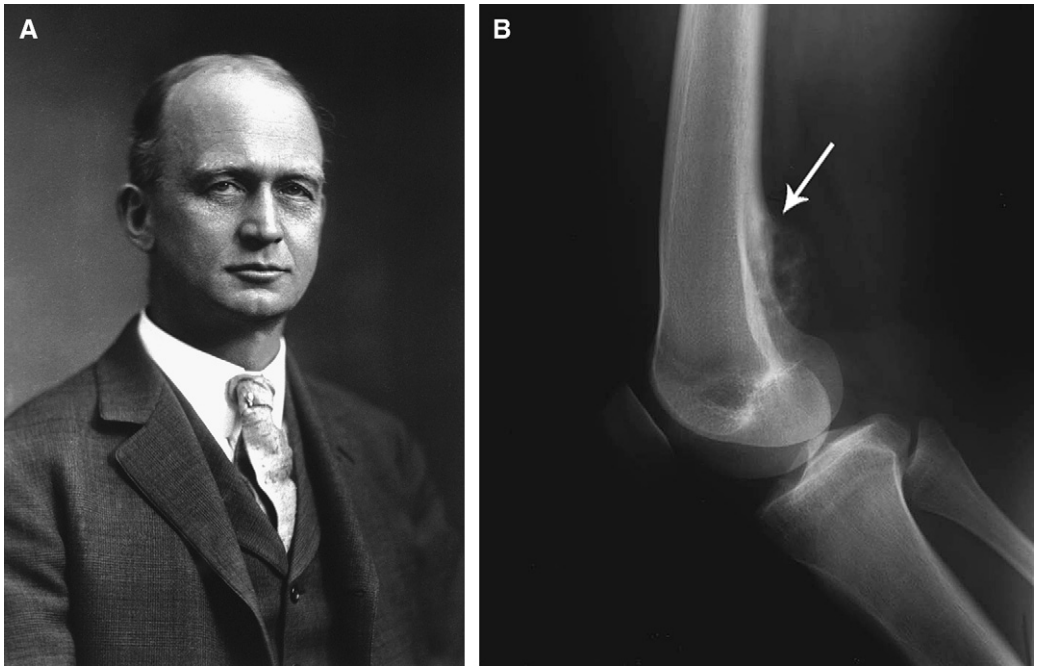


Figure 5. (A) Ernest Amory Codman (1869–1940). Courtesy of the National Library of Medicine. (B) Codman triangle: a localized, triangular ridge of new bone is formed where periosteum is elevated in rapidly growing bone processes, such as neoplasms, particularly osteosarcoma and osteomyelitis (arrow). Courtesy of MiASoft Systems Ltd.

To earn his living, Doppler worked as a bookkeeper at a cotton-spinning factory. After deciding to immigrate to America, he sold all he had to finance his journey. However, he cancelled his plans and stayed in Austria and waited for 2 years to get the post at the Technical Secondary School in Prague in 1835. For 5 years, he applied for a position as professor of higher mathematics at the Polytechnic in Prague but without success. Only in 1841 was he appointed to this post. Doppler's students complained that he was too harsh in his examining. Doppler was investigated and reprimanded, and the students were allowed to retake their examinations. Having a difficult time in Prague, Doppler moved to a professorship of mathematics, physics, and mechanics at the Academy of Mines and Forests in Banska Stiavnica. As a result of the stormy revolutionary year of 1848, Doppler sought refuge, finding it at the Vienna Polytechnic. On January 17, 1850, he was appointed as the first director of the new Institute of Physics at Vienna University, which was the highest point of his career. Just after Doppler's dreams came true, his health deteriorated. In November 1852, he traveled to Venice and died there a few months later.

Doppler had difficulty becoming a member of the Royal Bohemian Society. Only after he introduced his most famous ideas to the Royal Bohemian Society in 1842, was he elected as an ordinary member of the society. On May 25, 1842, Doppler presented the paper "On the coloured light of the double stars and certain other stars of the heavens." The paper described what came to be known for the first time as the Doppler principle, which relates the frequency of a source to its velocity relative to an observer. Doppler derived the principle in a few lines by treating both light and sound as longitudinal waves in ether and matter, respectively. Interestingly, Doppler was incorrect regarding light being a longitudinal wave. He also was wrong when he tried to

Figure 6. Christian Doppler (1803–1853).

illustrate his theory with an application to the colours of double stars; the effect is too small to be significant.

However, the situation with sound was different. In 1845, experiments were conducted with musicians while they were on railway trains and playing instruments and other trained musicians wrote down the apparent note as the train approached and then receded from them. In 1846, Doppler published a better version of his principle, in which he considered both the motion of the source and the motion of the observer. Doppler had many new ideas that led to many inventions, particularly of optical instruments and to improvement of existing ones.

*Bibliography*

[1] Doppler C. Über das farbige Licht der Doppelsterne und einiger anderer Gestirne des Himmels. Abhandlungen der königlichen böhmischen Gesellschaft der Wissenschaften 1843;2:465−82.

[2] Doppler C. Bemerkungen zu meiner Theorie des farbigen Lichtes der Doppelsterne, mit vorzüglicher Rücksicht auf die von Herrn Dr. Ballot in Utrecht dagegen erhobenen Bedenken. Annalen der Physik 1846;68:1−35.

[3] O'Connor JJ, Robertson EF. MacTutor history of mathematics. Available at:: http://www.mcs.st-and.ac.uk/. Accessed April 5, 2009.

[4] Roguin A. Christian Johann Doppler: the man behind the effect. Br J Radiol 2002;75:615−9.

**Fleischner lines: horizontal dense lines of atelectasis and healed infarction, often seen in the lower lung fields and vary from barely visible lines to shadows of about 5 mm in thickness. They are usually located about 1 to 3 cm above the dome of the diaphragm. Fleischner sign: a prominent central artery can be caused either by pulmonary hypertension that develops secondary to peripheral embolization or by distention of the vessel by a large clot.**

Fleischner lines and the Fleischner sign were described by Felix G. Fleischner (Figure 7), an Austrian and American radiologist. Fleischner was born in Vienna on July 29, 1893, and died on August 17, 1969, in Boston, MA. Fleischner graduated from the University of Vienna Medical School. After training in radiology, he became chief of the Roentgen Department of the Vienna CS Child's Hospital. In 1930, he became professor and head of radiology of the Second Medical Clinic of the university. Fleischner published 87 papers before World War II. He was also a renowned lecturer in radiology of the post-graduate courses sponsored by the University of Vienna and the American Medical Association.

In 1938, after the annexation of Austria by Hitler, Fleischner fled to Boston with his family. He worked in the radiology department of the Massachusetts General Hospital and in private practice in Greenfield, MA. In 1942, he got a position at Beth Israel Hospital, with appointments at Harvard and Tufts Medical Schools. Fleischner started the first formal residency training program in radiology at Boston Israel Hospital and became professor of radiology at Harvard in 1952. He strongly emphasized the value of radiologic teaching and research.

While working in the United States, Fleischner published an additional 165 scientific articles. He received many honors. Two international symposia, the first on pulmonary embolism and the second on frontiers of chest radiology, were dedicated to him. Interestingly, in 1965 at the 600th anniversary of the University of Vienna, Fleischner represented the Harvard Medical School. Fleischner retired from Beth Israel Hospital in 1960; however, he continued teaching at the Peter Bent Brigham Hospital and the Massachusetts General Hospital until his death. Fleischner died in August 1969, a few months before the inaugural meeting of a new multidisciplinary international society of leading experts in chest disease he had been invited to attend. The greatest memorial tribute

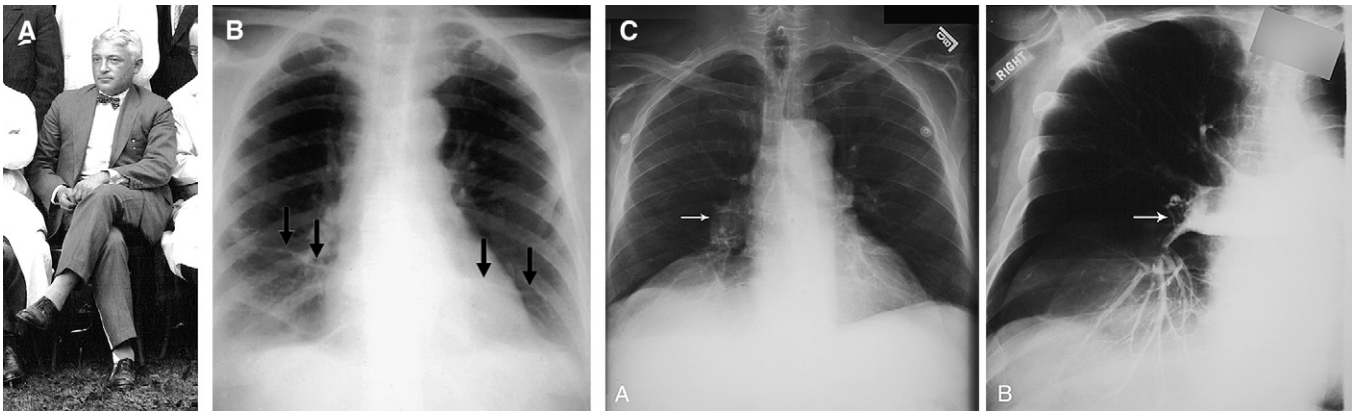


Figure 7. (A) Felix G. Fleischner (1893−1969). Original photograph made in Vienna in 1925. From the inheritance of Guido Holzknecht. With permission from the collections of the Medical University of Vienna. (B) Fleischner lines: horizontal lines of atelectasis in the lower lung fields (arrows). Courtesy of Dr K. Karuppasamy. (C). Fleischner sign: enlargement of the right interlobar artery (arrow). The follow-up angiogram (B) confirms the presence of filling defects, which represent multiple emboli and a distended right interlobar artery (arrow). Courtesy of Dr P. Burrowes.

was the adoption of his name by this prestigious society, now the Fleischner Society.

*Bibliography*

[1] Fleischner F. Plattenformige Atelektasen in der Unterlappen der Lunge. Fortschr Röntgenstr 1936;54:315–21.

[2] Fleischner F, Hampton AO, Castleman B. Linear shadows in the lung. AJR Am J Roentgenol 1941;46: 610–8.

[3] Fleischner F. Unilateral pulmonary embolism with increased compensatory circulation through the unoccluded lung. Radiology 1959;73:591–7.

[4] http://bidmc.harvard.edu/sites/bidmc/home.asp. Accessed January 24, 2007.

**Fraenkel line**: **white line of metaphyseal zone of preparatory calcification in cases of infantile scurvy.**

Eugen Fraenkel (Figure 8) was born on September 28, 1853, in the city of Neustadt, Silesia, Germany. He died in Hamburg on December 19, 1925. Fraenkel completed medical studies in Breslau in 1874 and started his medical career in Hamburg as an assistant at the ophthalmic clinic of St Georg Hospital. In 1879, he switched from ophthalmology to pathology, and, in 1889, he moved to the Institute of Pathology at Eppendorfer Hospital and worked there until 1924. In 1909, the Senate of Hamburg granted him the rank of professor. Fraenkel introduced new methods of bacteriology and x-rays into pathologic anatomy. He left works on scurvy (Möller-Barlow disease), congenital syphilis, and lymphoma. He wrote *The Atlas of Normal and Pathologic Anatomy in Typical X-ray Images*. His name is frequently misspelled: in Grainger & Allison's *Diagnostic Radiology,* it is spelled ''Frankl''; in Dahnert's *Radiology Review Manual,* it is spelled ''Fränkel.''

*Bibliography*

[1] Fraenkel E. Untersuchungen über die Möller-Barlowsche Krankheit. Fortschr Röntgenstr 1903–4;7:231–65, 291–310.

[2] Fraenkel E. Untersuchungen über die Möller-Barlowsche Krankheit. Fortschr Röntgenstr 1906–7;10:1–20.

[3] Fraenkel E. Archiv und Atlas der normalen und pathologischen Anatomie in typischen Röntgenbildern. Hamburg: 1910.

[4] Fraenkel E. Die kongenitale Knochensyphilis im Röntgenbilde. Archiv und Atlas der normalen und pathologischen Anatomie. Hamburg: Gräfe & Sillem; 1911.

**Golden's sign: elevation and medial displacement of the minor fissure with proximal convexity of the fissure and creation of the "reverse S," a form of right upper lobe collapse associated with right upper lobe bronchus obstruction.**

Ross Golden (Figure 9) was born in Iowa Center, IA, on September 30, 1889, into the family of a Methodist minister. He died in California on January 10, 1975. Golden was a member of the baseball and football teams in Manning High School, Manning, IA. After graduating from Harvard Medical School, he served in France in World War I. Golden was one of the first students to go through the original radiology residency program at the Massachusetts General Hospital. He worked at the Presbyterian Hospital in New York on the faculty of Columbia University Medical School. At that time, he published the work that made his name famous. He described 5 cases of bronchial invasion by cancer. Two cases (cases III and V) described tumours obstructing the right upper lobe bronchus, with resultant shadow with a sharply defined concave lower margin. Later, the lower margin of the shadow bulged downward and progressed to convex, with a concave portion located towards the periphery. He did not mention the resemblance of the margin of this shadow to a reverse S. In fact, we were unable

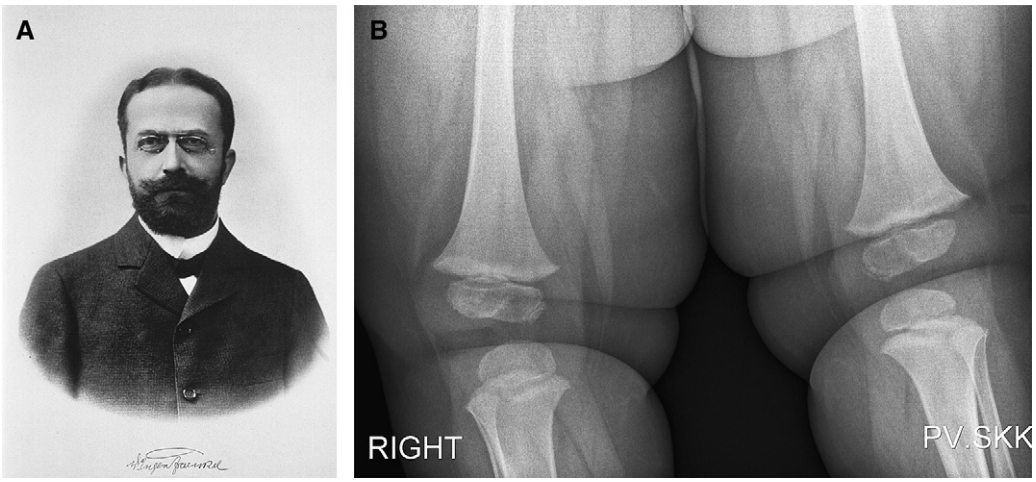


Figure 8. (A) Eugen Fraenkel (1853–1925). Courtesy of the National Library of Medicine. (B) Fraenkel line: white line of metaphyseal zone of preparatory calcification in cases of infantile scurvy. Courtesy of MiASoft Systems Ltd.

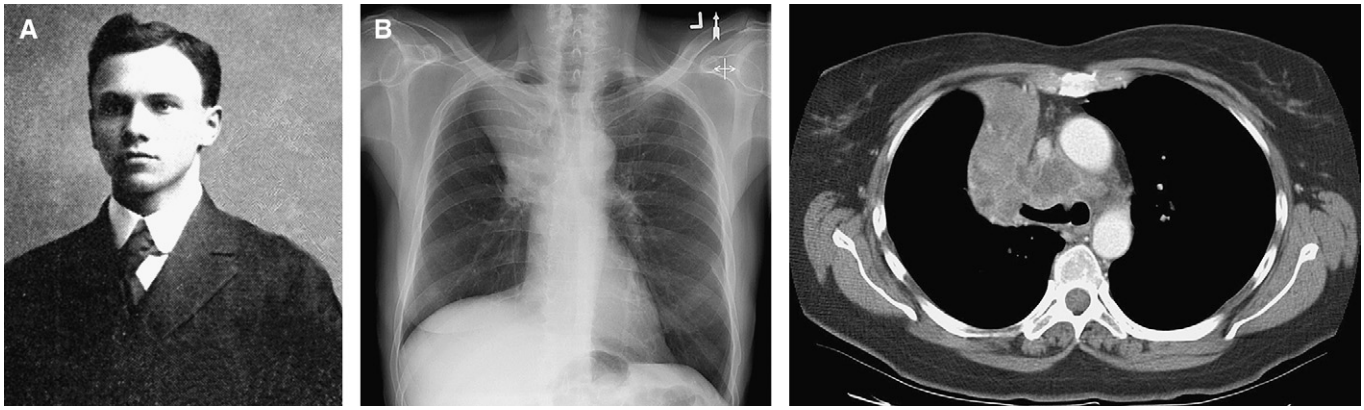


Figure 9. (A) Ross Golden (1889–1975). Courtesy of David Kusel. (B) Golden sign: elevation and medial displacement of the minor fissure with proximal convexity of the fissure. Courtesy of Dr P. Burrowes.

to trace who was the first to introduce the term "reverse S sign." In 1927, Golden went to Vienna to take classes from distinguished radiologists. L. Rigler (Rigler sign) was taking the same classes with Golden.

Golden wrote chapters on the roentgen diagnosis of diseases of the small intestine. He helped to organize the American College of Radiology and was a president of the American Roentgen Ray Society. After retiring in 1954 from Columbia, Golden worked for more than 10 years at the University of California, Los Angeles, CA, where the departmental library was established as the Ross Golden Room. Golden was known for his intolerance of incompetence, indifference, and indolence. The year of birth of Golden in the memoriam published in *Radiology* in 1975 is incorrect.

*Bibliography*

[1] Golden R. The effect of bronchostenosis upon the roentgen ray shadow in carcinoma of the bronchus. AJR Am J Roentgenol 1925;13:21–30.

[2] Rigler LG. In memoriam. Ross Golden, M.D. 1890–1975. Radiology 1975;116:742–3.

**Hampton hump: a pleural-based, shallow, wedge-shaped consolidation in the lung periphery seen in pulmonary embolism. Hampton line: a thin, well-defined lucent line at the base of the ulcer, reflecting the undermining of the submucosa, with preservation of the relatively resistant mucosa.**

Aubrey Otis Hampton (Figure 10) was born in 1900 in Copeville, TX. He died on July 17, 1955. Aubrey Hampton graduated from Baylor University Medical School, TX, in 1925. He did his radiologic training at the Massachusetts General Hospital in Boston, MA. Several years later, he was appointed their chief of the Department of Radiology. During World War II, he stayed stateside as chief of the Department of Radiology at Walter Reed Army Hospital, Washington, DC. After the war, he was appointed chief consultant in radiology to the medical director of the Veteran's Administration. Hampton was responsible for the creation of a fellowship for radiologic pathology at the Armed Forces Institute of Pathology.

Hampton was probably one of the most intuitive radiologists of his time. People who worked with Hampton noted that he abhorred systematic and didactic teaching. He used to skip the explanations of preliminary reasons for making a diagnosis, leaving to others to find out why he had made his decision. However, the accuracy of his diagnoses was so high that even this challenge was educational. Hampton was at his best as a clinical radiologist in the daily routine. His innumerable clinical friends made him the center of their investigating teams. His independent approach to every case was constantly stimulating. His students learned from him to think independently rather than to depend entirely on textbook wisdom. He was a man of unusual charm. He made friends easily and kept them. Illness made his last years of life difficult, and his early death in 1955 came as a relief to him.

*Bibliography*

[1] Hampton AO, Castleman B. Correlation of postmortem chest teleroentgenograms with autopsy findings. Am J Roentgenol Radium Ther 1940;43:305–26.

[2] Hampton AO, Schumacher FV. Radiographic differentiation of benign and malignant gastric ulcers. Clin Symp 1956;8:161–71.

[3] Schatzki R, Lingley JR. Aubrey O. Hampton, 1900–1955. Am J Roentgenol Radium Ther Nucl Med 1956;75:396–7.

**Hounsfield artifact–beam hardening artifact: increased attenuation of the x-ray beam because of the density and thickness of the bone.**

Sir Godfrey Newbold Hounsfield (Figure 11) was born in Sutton-on-Trent, near Newark in Nottinghamshire, England, on August 28, 1919. He died on August 12, 2004, in Kingston upon Thames, England. Hounsfield was educated at Magnus Grammar School in Newark-on-Trent and had excelled in physics and arithmetic. He graduated from London's City and Guilds College in 1938 after studying

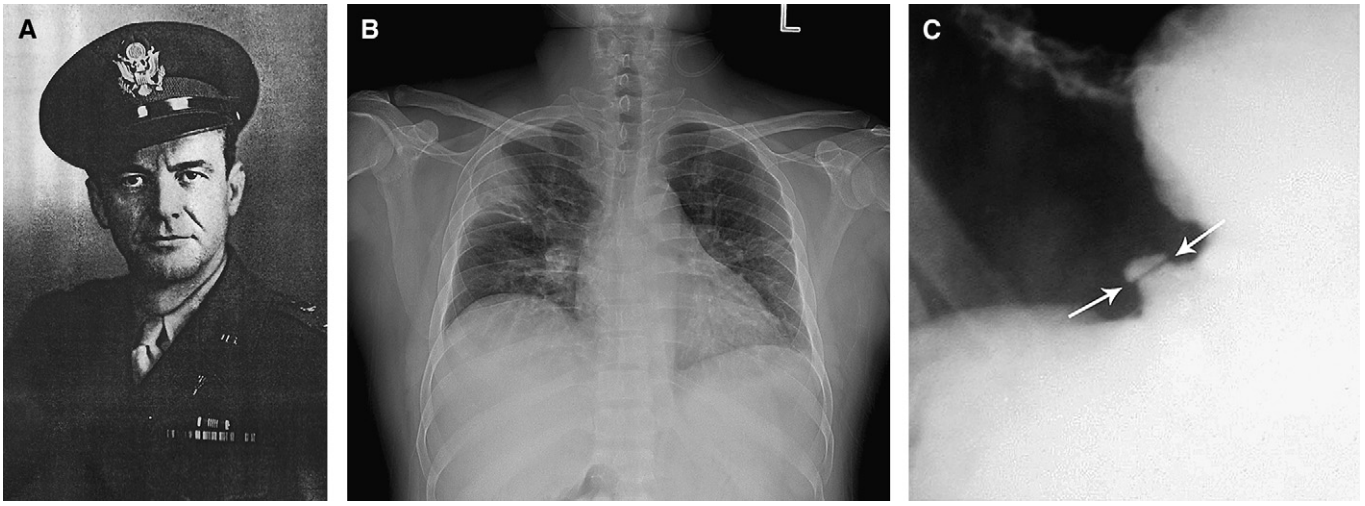


Figure 10. (A) Aubrey Otis Hampton (1900–1955). Published with permission from the *American Journal of Roentgenology.* (B) Hampton hump: a peripheral opacity overlying the lateral aspect of the right lung caused by infarction from pulmonary embolus. (C) Hampton line: a thin, well-defined lucent line at the base of the ulcer (arrows), reflecting the undermining of the submucosa, with preservation of the relatively resistant mucosa. Published with permission from Dr W. Herring.

radio communication. He joined the Royal Air Force as a volunteer shortly before World War II. There he learned the basics of electronics and radar. After the war, he attended Faraday House College of Electrical Engineering in London and graduated with a Diploma of Faraday House.

In 1951, Hounsfield joined Electrical and Musical Industries, where he worked on improving radar systems and then on computers. He helped complete production of Britain's first large all-transistor computer in 1959, worked on high-capacity computer memory devices, and was granted a British patent in 1967 for ''Magnetic Films for Information Storage.'' Hounsfield's work in this period included the problem of enabling computers to recognize patterns, thus allowing them to ''read'' letters and numbers.

Without any background knowledge in medicine and roentgenology, and being unaware of the equations of reconstructing an image via computer, which had been developed by American physicist Allan M. Cormack, Hounsfield envisioned a medical diagnostic system in which an x-ray machine would image thin ''slices'' through the patient's body, and a computer would process the slices into an accurate representation. He enlisted radiologists who assisted him with practical knowledge of radiology and provided tissue samples and test animals for scans. In just a few years, he succeeded in putting his idea into practice. In 1971, a test machine for imaging the brain was installed at Atkinson Morley's Hospital in Wimbledon. It was highly successful, and the first production model followed a year

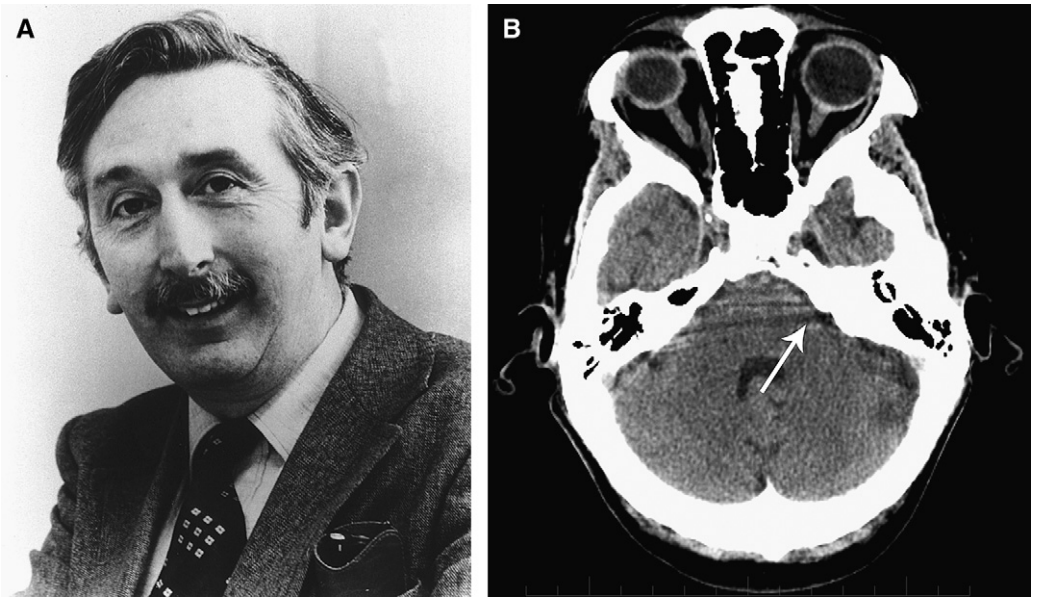


Figure 11. (A) Godfrey Newbold Hounsfield (1919–2004). Courtesy of the National Library of Medicine. (B) Hounsfield artifact: increased attenuation of the x-ray beam because of the density and thickness of the bone (arrow).

later. The ''whole-body scanner'' went on the market in 1975.

In 1979, Hounsfield was awarded the Nobel Prize for Physiology or Medicine, shared with Allan M. Cormack. Neither of them had a degree in medicine or biology, or a doctorate in any field. Hounsfield was appointed Commander of the British Empire in 1976 and knighted in 1981. He never married.

*Bibliography*

[1] Hounsfield GN. Autobiography. Available at: http://nobelprize.org. Accessed April 5, 2009.

[2] Engineers and Inventors. New York: Peter Bedrick Books; 1986: 85–6.

[3] Di Chiro G, Brooks RA. The 1979 Nobel Prize in physiology or medicine. Science 1979:1060–2.

**Kerley B lines: Horizontal lines of striped shadows, usually best seen in the lower zones of the lungs. They are a sign of congestive heart disease and thought to be from fluid in the interlobular septa.**

Sir Peter James Kerley (Figure 12) was born in Dundalk, Ireland, on October 27, 1900, the youngest of 13 children. He died on March 15, 1979. Kerley was qualified at the National University in Dublin in 1923. He traveled to Vienna to study ear, nose, and throat diseases but changed his mind and dedicated a year to his radiologic training. He obtained his medical degree from the University in Dublin in 1932.

Kerley was appointed director of radiology at the Westminster Hospital and National Heart Hospitals and became an adviser on radiology to the Ministry of Health. He was president of the radiology section of the Royal Society of Medicine in 1939–1940 and of the Faculty of Radiologists from 1952 to 1955. Kerley was a founding member of the College of Radiology and later its president. He was an honorary member of the Chicago Radiological Society and the Australian College of Radiology, and Fellow of Honour of the Faculty of Radiologists in Ireland. He became the editor of the *Journal of Radiology*, and later wrote the 6-volume *Textbook of X-ray Diagnosis*, which includes the description of the Kerley B lines of left ventricular failure, and the A and C lines on the chest x-ray.

In recognition of distinguished services to the Royal House, he was made Commander of the Royal Victorian Order in 1952 and Knight Commander of the Royal Victorian Order 20 years later. He showed an Irish disregard for time, believing that ''he who made time made plenty of it.'' He was a lover of wine and food, a superb fisherman, and a good shot. On his trout fishing in Scotland, King George VI was among his companions. When the local doctor suggested an x-ray for the monarch, Kerley arranged the procedure back in London and broke the news of lung tumour to the king.

The Sir Peter Kerley Lecture of the Royal College of Radiologists is named for him.

In a few sources, including the www.whonamedit.com Web site, it is mistakenly stated that he obtained his MD from the National University in Dublin, in 1939, and that he died in 1978.

*Bibliography*

[1] Kerley P. Lung changes in acquired heart disease. Am J Roentgenol Radium Ther Nucl Med 1958;80:256–63.

[2] Simpson L. Irish contributions to our understanding of heart disease. Heart Lung Circ 2003;12(Suppl 2):73–7.

[3] Peter James Kerley. Lancet 1979;1:735.

[4] Peter James Kerley. New general catalog of old books and authors. Available at: http://www.authorandbookinfo.com/ngcoba/ke.htm. Accessed November 15, 2006.

**Naclerio V-sign**: **air dissecting along diaphragmatic and mediastinal fascial planes in the region of the lower esophagus.**

V-shaped collection of air in the left lower mediastinum and along the diaphragm and seen in pneumomediastinum. One limb of the ''V'' is produced by mediastinal air outlining the left lower lateral mediastinal border. The other limb is produced by air between the parietal pleura and medial left hemidiaphragm. Mediastinal air at this location is frequently seen in the presence of esophageal perforation. The V-sign of Naclerio was described as a chest radiograph finding in as

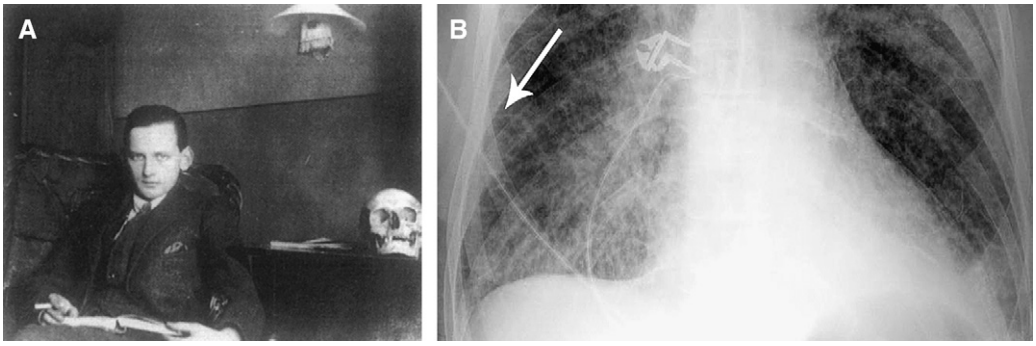


Figure 12. (A) Peter James Kerley (1900–1979). Published with permission from Elsevier. (B) Kerley B lines: horizontal lines are a sign of congestive heart disease and are from fluid in the interlobular septa.

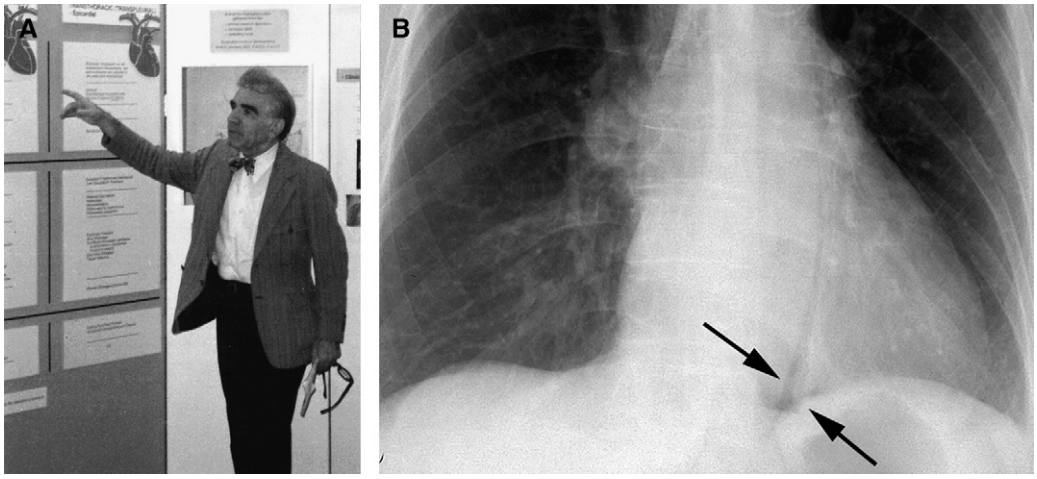


Figure 13. (A) Emil A. Naclerio (1915–1985). Courtesy of Ronald Naclerio, son of Dr Emil A. Naclerio. (B) Naclerio V-sign: V-shaped collection of air dissecting along diaphragmatic and mediastinal fascial planes (arrows) in the region of the lower esophagus. Published with permission from the RSNA and Dr R. Sinha.

many as 20% of patients. This involves the presence of radiolucent streaks of air that dissect the fascial planes behind the heart to form the shape of the letter V. It is a fairly specific, although insensitive, radiographic sign of esophageal perforation.

Dr Emil A. Naclerio (Figure 13) was born on March 21, 1915. He died on October 14, 1985, in Brooklyn, NY. Naclerio worked as a thoracic surgeon at Harlem Hospital. Later, he helped to develop methods for inserting pacemakers and wrote books on chest injuries. In 1958, while the thoracic surgeon on call, Naclerio helped save the life of Martin Luther King Jr after a stabbing on September 20, 1958, by Izola Ware Curry. Stabbed with a 7-inch letter opener, King was taken to Harlem Hospital, where Naclerio was 1 of 3 surgeons who removed the weapon from King's chest and operated on him for 2.5 hours.

*Bibliography*

[1] Naclerio EA. The V sign in the diagnosis of spontaneous rupture of the esophagus (an early roentgen clue). Am J Surg 1957;93:291–8.

[2] Ackert K. King on his court. Cardozo coach honors dad and revered patient. NY Daily News, January 20, 2003.

[3] Sinha R. Naclerio's V sign. Radiology 2007;245:296–7.

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